

WHAT IS CLAIMED IS:

1. An anaerobic digester comprising:

a first covered fluid containment means comprising a first upper section and a first lower section, an aqueous slurry comprising anaerobically digestible fiber disposed within the first covered
5 containment means;

a second covered fluid containment means disposed within the first covered containment means, the second covered fluid containment means comprising a second upper section and a second lower section;

the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper
10 section of the first covered fluid containment means, the first fluid inlet having a screen disposed at the interface of the first covered fluid containment means and the second covered fluid containment means, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered fluid containment means through the first fluid inlet into the second covered containment means, said filter cake comprising said fiber;

15 said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered fluid containment means;

gas processing means for receiving and processing gas from the first gas outlet; and

20 liquid processing means for receiving liquid from the first liquid outlet.

2. The anaerobic digester of claim 1 wherein the first covered containment means comprises a pond covered with a membrane, the membrane impervious to oxygen flow.

3. The anaerobic digester of claim 1 wherein the second covered fluid containment means comprises a cylindrical vessel.

25 4. The anaerobic digester of claim 1 wherein the first liquid outlet comprises a loop seal for controlling the fluid level in the second covered fluid containment means.

5. The anaerobic digester of claim 1 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

6. The anaerobic digester of claim 1 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered fluid containment means hydraulically connected to the first liquid outlet.
7. The anaerobic digester of claim 6 wherein the third covered fluid containment means comprises
5 a third upper section and a third lower section.
8. The anaerobic digester of claim 7 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.
9. An anaerobic digester comprising:
 - a first covered fluid containment means comprising a first upper section and a first lower section
 - 10 and a first slurry inlet for receiving an aqueous slurry comprising anaerobically digestible fiber;
 - a second covered fluid containment means disposed within the first covered containment means, the second covered fluid containment means comprising a second upper section and a second lower section;
 - the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper
15 section of the first covered fluid containment means, the first fluid inlet having a screen disposed at the interface of the first covered fluid containment means and the second covered fluid containment means, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered fluid containment means through the first fluid inlet into the second covered containment means, said filter cake comprising said fiber;
 - 20 said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;
 - circulating means for circulating the aqueous slurry through the first covered fluid containment means;
 - gas processing means for receiving and processing gas from the first gas outlet; and
 - 25 liquid processing means for receiving liquid from the first liquid outlet.
10. The anaerobic digester of claim 9 wherein the first covered containment means comprises a pond covered with a membrane, the membrane impervious to oxygen flow.
11. The anaerobic digester of claim 9 wherein the second covered fluid containment means

comprises a cylindrical vessel.

12. The anaerobic digester of claim 9 wherein the first liquid outlet comprises a loop seal for controlling the fluid level in the second covered fluid containment means.

13. The anaerobic digester of claim 9 wherein the gas processing means for receiving and
5 processing gas from the first gas outlet comprises a gas scrubbing system.

14. The anaerobic digester of claim 9 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered fluid containment means hydraulically connected to the first liquid outlet.

15. The anaerobic digester of claim 14 wherein the third covered fluid containment means
10 comprises a third upper section and a third lower section.

16. The anaerobic digester of claim 15 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.

17. An anaerobic digester comprising:

15 a first covered fluid containment means comprising a first upper section and a first lower section, an aqueous slurry comprising anaerobically digestible fiber disposed within the first covered containment means;

a second covered fluid containment means disposed adjacent to the first covered containment means, the second covered fluid containment means comprising a second upper section and a second lower section;

20 the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered fluid containment means, the first fluid inlet having a screen disposed at the interface of the first covered fluid containment means and the second covered fluid containment means, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered fluid containment means through the first fluid inlet into the second covered containment means, said filter
25 cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered fluid containment

means;

gas processing means for receiving and processing gas from the first gas outlet; and

liquid processing means for receiving liquid from the first liquid outlet.

18. The anaerobic digester of claim 17 wherein the first covered containment means comprises a pond covered with a membrane, the membrane impervious to oxygen flow.
19. The anaerobic digester of claim 17 wherein the second covered fluid containment means comprises a cylindrical vessel.
20. The anaerobic digester of claim 17 wherein the first liquid outlet comprises a loop seal for controlling the fluid level in the second covered fluid containment means.
21. The anaerobic digester of claim 17 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.
22. The anaerobic digester of claim 17 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered fluid containment means hydraulically connected to the first liquid outlet.
23. The anaerobic digester of claim 22 wherein the third covered fluid containment means comprises a third upper section and a third lower section.
24. The anaerobic digester of claim 23 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.
25. An anaerobic digester comprising:
 - a first covered fluid containment means comprising a first upper section and a first lower section and a first slurry inlet for receiving an aqueous slurry comprising anaerobically digestible fiber;
 - a second covered fluid containment means disposed adjacent to the first covered containment means, the second covered fluid containment means comprising a second upper section and a second lower section;
 - the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered fluid containment means, the first fluid inlet having a screen disposed at the interface of the first covered fluid containment means and the second covered fluid containment means, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered fluid

containment means through the first fluid inlet into the second covered containment means, said filter cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

5 circulating means for circulating the aqueous slurry through the first covered fluid containment means;

gas processing means for receiving and processing gas from the first gas outlet; and

liquid processing means for receiving liquid from the first liquid outlet.

26. The anaerobic digester of claim 25 wherein the first covered containment means comprises a
10 pond covered with a membrane, the membrane impervious to oxygen flow.

27. The anaerobic digester of claim 25 wherein the second covered fluid containment means comprises a cylindrical vessel.

28. The anaerobic digester of claim 25 wherein the first liquid outlet comprises a loop seal for controlling the fluid level in the second covered fluid containment means.

15 29. The anaerobic digester of claim 25 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

30. The anaerobic digester of claim 25 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered containment means hydraulically connected to the first liquid outlet.

20 31. The anaerobic digester of claim 30 wherein the third covered containment means comprises a third upper section and a third lower section.

32. The anaerobic digester of claim 31 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.

33. An anaerobic digester comprising:

25 a first covered vessel comprising a first end and a second end, a first upper section and a first lower section, an aqueous slurry comprising anaerobically digestible fiber disposed within the first covered vessel;

a second covered vessel disposed within the first covered vessel, the second covered vessel

comprising a second upper section and a second lower section;

the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered vessel, the first fluid inlet having a screen disposed at the interface of the first covered vessel and the second covered vessel, the screen adapted for formation of a filter cake
 5 thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered vessel;

10 gas processing means for receiving and processing gas from the first gas outlet; and
 liquid processing means for receiving liquid from the first liquid outlet.

34. The anaerobic digester of claim 33 wherein the first covered vessel is rectangular.

35. The anaerobic digester of claim 33 wherein the aqueous slurry comprises 1 to 15 percent solids.

15 36. The anaerobic digester of claim 33 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

37. The anaerobic digester of claim 33 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered vessel hydraulically connected to the first liquid outlet.

38. The anaerobic digester of claim 37 wherein the third covered vessel comprises a third upper
 20 section and a third lower section.

39. The anaerobic digester of claim 38 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.

40. An anaerobic digester comprising:

a first covered vessel comprising a first end and a second end, a first upper section and a first
 25 lower section and a first slurry inlet for receiving an aqueous slurry comprising anaerobically digestible fiber;

a second covered vessel disposed within the first covered vessel, the second covered vessel comprising a second upper section and a second lower section;

the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered vessel, the first fluid inlet having a screen disposed at the interface of the first covered vessel and the second covered vessel, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered vessel;

gas processing means for receiving and processing gas from the first gas outlet; and

liquid processing means for receiving liquid from the first liquid outlet.

41. The anaerobic digester of claim 40 wherein the first covered vessel is rectangular.

42. The anaerobic digester of claim 40 wherein the aqueous slurry comprises 1 to 15 percent solids.

43. The anaerobic digester of claim 40 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

44. The anaerobic digester of claim 40 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered vessel hydraulically connected to the first liquid outlet.

45. The anaerobic digester of claim 44 wherein the third covered vessel comprises a third upper section and a third lower section.

46. The anaerobic digester of claim 45 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.

47. An anaerobic digester comprising:

a first covered vessel comprising a first end and a second end, a first upper section and a first lower section, an aqueous slurry comprising anaerobically digestible fiber disposed within the first covered vessel;

a second covered vessel disposed adjacent to the first covered vessel, the second covered vessel comprising a second upper section and a second lower section;

the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper

section of the first covered vessel, the first fluid inlet having a screen disposed between the first covered vessel and the second covered vessel, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber;

5 said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

 circulating means for circulating the aqueous slurry through the first covered vessel;

 gas processing means for receiving and processing gas from the first gas outlet; and

 liquid processing means for receiving liquid from the first liquid outlet.

10 48. The anaerobic digester of claim 47 wherein the first covered vessel is rectangular.

49. The anaerobic digester of claim 47 wherein the aqueous slurry comprises 1 to 15 percent solids.

50. The anaerobic digester of claim 47 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

15 51. The anaerobic digester of claim 47 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered vessel hydraulically connected to the first liquid outlet.

52. The anaerobic digester of claim 51 wherein the third covered vessel comprises a third upper section and a third lower section.

53. The anaerobic digester of claim 52 wherein the third upper section comprises a second gas
20 outlet and the third lower section comprises a second liquid outlet.

54. An anaerobic digester comprising:

 a first covered vessel comprising a first end and a second end, a first upper section and a first lower section and a first slurry inlet for receiving an aqueous slurry comprising anaerobically digestible fiber;

25 a second covered vessel disposed adjacent to the first covered vessel, the second covered vessel comprising a second upper section and a second lower section;

 the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered vessel, the first fluid inlet having a screen disposed between the first covered

vessel and the second covered vessel, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section

5 comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered vessel;

gas processing means for receiving and processing gas from the first gas outlet; and

liquid processing means for receiving liquid from the first liquid outlet.

55. The anaerobic digester of claim 54 wherein the first covered vessel is rectangular.

10 56. The anaerobic digester of claim 54 wherein the aqueous slurry comprises 1 to 15 percent solids.

57. The anaerobic digester of claim 54 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

15 58. The anaerobic digester of claim 54 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered vessel hydraulically connected to the first liquid outlet.

59. The anaerobic digester of claim 58 wherein the third covered vessel comprises a third upper section and a third lower section.

60. The anaerobic digester of claim 59 wherein the third upper section comprises a second gas outlet and the third lower section comprises a second liquid outlet.

20 61. An anaerobic digester system comprising:

a first digester module comprising:

a first covered vessel comprising a first end and a second end, a first upper section and a first lower section, a first slurry inlet at the first end for receiving an aqueous slurry comprising anaerobically digestible fiber and a first slurry outlet at the second end for discharging aqueous slurry;

25

a second covered vessel disposed adjacent to the first covered vessel, the second covered vessel comprising a second upper section and a second lower section;

the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered vessel, the first fluid inlet having a screen disposed between the first covered vessel and the second covered vessel, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber;

said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet;

circulating means for circulating the aqueous slurry through the first covered vessel;

gas processing means for receiving and processing gas from the first gas outlet;

liquid processing means for receiving liquid from the first liquid outlet; and

a second digester module comprising a fourth covered vessel comprising a second slurry inlet for receiving aqueous slurry from the first slurry outlet of the first digester module.

62. The anaerobic digester system of claim 61 wherein the first covered vessel of the first digester module is rectangular.

63. The anaerobic digester system of claim 61 wherein the fourth covered vessel of the second digester module is rectangular.

64. A method of processing an aqueous slurry comprising anaerobically digestible fiber, the method comprising the steps of:

(a) disposing the aqueous slurry into an anaerobic digester comprising: (i) a first covered fluid containment means comprising a first upper section and a first lower section; (ii) a second covered fluid containment means disposed within the first covered containment means, the second covered fluid containment means comprising a second upper section and a second lower section; (iii) the second upper section comprising a first fluid inlet for receiving fluid flow from the first upper section of the first covered fluid containment means, the first fluid inlet having a screen disposed between the first covered fluid containment means and the second covered fluid containment means, the screen adapted for

formation of a filter cake thereon upon fluid flow from the first covered fluid containment means through the first fluid inlet into the second covered containment means, said filter cake comprising said fiber;

(iv) said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet; and (v) circulating means for circulating the aqueous slurry through the first covered

5 fluid containment means;

(b) receiving gas from the first outlet means into a gas processing means for receiving and processing gas; and

(c) receiving liquid from the first liquid outlet into a liquid processing means.

65. The method of claim 64 wherein the first covered containment means comprises a pond
10 covered with a membrane, the membrane impervious to oxygen flow.

66. The method of claim 64 wherein the second covered fluid containment means comprises a cylindrical vessel.

67. The method of claim 64 wherein the first liquid outlet comprises a loop seal for controlling the fluid level in the second covered fluid containment means.

15 68. The method of claim 64 wherein the gas processing means for receiving and processing gas from the first gas outlet comprises a gas scrubbing system.

69. The method of claim 64 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered fluid containment means hydraulically connected to the first liquid outlet.

20 70. The method of claim 69 wherein the third covered fluid containment means comprises a third upper section and a third lower section.

71. A method of processing an aqueous slurry comprising anaerobically digestible fiber, the method comprising the steps of:

25 (a) disposing the aqueous slurry comprising anaerobically digestible fiber into an anaerobic digester comprising: (i) a first covered vessel comprising a first end and a second end, a first upper section and a first lower section; (ii) a second covered vessel disposed adjacent to the first covered vessel, the second covered vessel comprising a second upper section and a second lower section; (iii) the second upper section comprising a

first fluid inlet for receiving fluid flow from the first upper section of the first covered vessel, the first fluid inlet having a screen disposed between the first covered vessel and the second covered vessel, the screen adapted for formation of a filter cake thereon upon fluid flow from the first covered vessel through the first fluid inlet into the second covered vessel, said filter cake comprising said fiber; (iv) said second upper section comprising a first gas outlet and said second lower section comprising a first liquid outlet; and (v) circulating means for circulating the aqueous slurry through the first covered vessel;

(b) receiving gas from the first gas outlet means into a gas processing means for receiving processing gas; and

(c) receiving liquid from the first liquid outlet into a liquid processing means.

72. The method of claim 71 wherein the first covered vessel is rectangular.

73. The method of claim 71 wherein the aqueous slurry comprises 1 to 15 percent solids.

74. The method of claim 71 wherein the gas processing means for receiving and processing gas

from the first gas outlet comprises a gas scrubbing system.

75. The method of claim 71 wherein the liquid processing means for receiving liquid from the first liquid outlet comprises a third covered fluid containment means hydraulically connected to the first liquid outlet.

76. The method of claim 75 wherein the third covered fluid containment means comprises a third upper section and a third lower section.